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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/714,857	KANAMORI ET AL.	
	Examiner	Art Unit	
	JASON R. KURR	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 February 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) *8-10 and 21-26* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,11-20,27 and 28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/21/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Claims 8-10 and 21-26 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on February 26, 2008.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 7 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda (US 6,285,768 B1) in view of Zhang et al (US 7,181,026 B2).

With respect to claim 1, Ikeda discloses a microphone device which detects a target sound coming from a direction of the target sound, comprising: a signal generating section (fig.2 #1,2) for generating a main signal (fig.2 “x(k)”) indicative of a result obtained through detection with a sensitivity in the direction of the target sound and a noise reference signal (fig.2 “y(k)”) indicative of a result obtained through detection with a sensitivity higher in another direction than in the direction of the target sound (col.1 ln.47-55); a determining section (fig.2 #10,18) for determining whether a

level ratio indicative of a ratio of a level of the main signal to the noise reference signal generated by the signal generating section is larger than a predetermined value (col.5 ln.49-60); an adaptive filter section (fig.2 #4) for generating a signal indicative of a signal component of the target sound included in the noise reference signal generated by the signal generating section by performing, by an adaptive filter included in the adaptive filter section, a filtering process on the main signal generated by the signal generating section (col.2 ln.28-36), and for learning a filter coefficient only when the determining section determines that the level ratio is larger than the predetermined value (col.5 ln.61-67, col.1 ln.1-59); a subtracting section (fig.2 #5) for subtracting the signal generated by the adaptive filter section (fig.2 "r(k)") from the noise reference signal generated by the signal generating section.

Ikeda does not disclose expressly a noise suppressing section for suppressing a signal component of noise included in the main signal by using the main signal and the noise reference signal after subtraction by the subtracting section.

Zhang discloses a post-processing noise suppression section (fig.3 #31) for adaptive directional microphone systems that suppresses a signal component of noise included in a main signal (fig.3 "m1(n)") by using the main signal and a noise reference signal (fig.3 "e1(n)") after subtraction by a subtracting section (fig.3 #22). At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the post-processing section (fig.3 #31) of Zhang on the output of the noise cancelling system of Ikeda. The motivation for doing so would have been to enhance the

noise/interference suppression of the adaptive directional microphone system as taught by Zhang (col.2 ln.65-67, col.3 ln.1-4).

With respect to claim 2, Ikeda discloses the microphone device according to claim 1, wherein the signal generating section includes: a first microphone unit being placed so that a main axis of directivity is oriented to the direction of the target sound; and a second microphone unit being placed so that a minimum sensitivity axis of directivity is oriented to the direction of the target sound (col.1 ln.47-55).

With respect to claim 3, Ikeda discloses the microphone device according to claim 1, further comprising a signal delaying section (fig.2 #3), being provided between an output end of the noise reference signal in the signal generating section and the subtracting section, for delaying the noise reference signal so as to satisfy conditions of convergence of the adaptive filter of the adaptive filter section (col.1 ln.60-65).

With respect to claim 4, Ikeda discloses the microphone device according to claim 1, wherein the predetermined value is changeable (col.5 ln.30-35).

With respect to claim 7, Ikeda discloses the microphone device according to claim 1, wherein the signal generating section includes: a first microphone unit; a second microphone unit having a characteristic identical to a characteristic of the first microphone unit (fig.2 #1,2, col.1 ln.47-55); and a combining section (fig.2 #13) for generating, based on signals output from the first and second microphone unit, the main signal with the sensitivity in the direction of the target sound, and generating a noise signal with minimum sensitivity in the direction of the target sound.

With respect to claim 12, Ikeda discloses the microphone device according to claim 1, wherein the noise suppressing section includes: a time-variant coefficient filter section (Zhang: fig.4 #31) for causing the main signal (Zhang: fig.4 “m1(n)”) to be subjected to a filtering process at a noise suppression filter (Zhang: fig.4 #49) included in the time-variant coefficient filter section; and a noise suppression filter coefficient calculating section (Zhang: fig.4 #45-47) for calculating, based on the main signal and the noise reference signal after subtraction by the subtracting section, a filter coefficient of the noise suppression filter for suppressing the signal component of the noise included in the main signal, wherein the filtering process reflects the filter coefficient calculated by the noise suppression filter coefficient calculating section (Zhang: col.5 ln.46-67, col.6 ln.1-41).

With respect to claim 13, Ikeda discloses the microphone device according to claim 12, wherein the noise suppression filter coefficient calculating section includes: a first frequency analyzing section (Zhang: fig.4 #41) for calculating a power spectrum of the main signal (Zhang: col.5 ln.46-54): a second frequency analyzing section (Zhang: fig.4 #42) for calculating a power spectrum of the noise reference signal after subtraction by the subtracting section (Zhang: col.5 ln.50-55); a power spectrum ratio calculating section (Zhang: fig.4 #45) for calculating a time average of a power spectrum ratio between the power spectrum calculated by the first frequency analyzing section and the power spectrum calculated by the second frequency analyzing section only when the determining section determines that the level ratio is smaller than the predetermined value; a multiplying section (Zhang: fig.4 #46) for multiplying the time

average of the power spectrum ratio calculated by the power spectrum ratio calculating section by the power spectrum calculated by the second frequency analyzing section; and a coefficient calculating section (Zhang: fig.4 #47) for calculating the filter coefficient of the noise suppression filter based on the power spectrum calculated by the first frequency analyzing section and the multiplication result of the multiplying section (Zhang: col.5 ln.46-67, col.6 ln.1-41).

Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda (US 6,285,768 B1) in view of Zhang et al (US 7,181,026 B2) and in further view of Buck et al (US 7,020,291 B2).

With respect to claim 5, Ikeda discloses the microphone device according to claim 1, however does not disclose expressly the details of the signal generating section.

Buck discloses a method of generating a main signal (fig.4a “P”) and a reference signal (fig.4a “R”) including: a first microphone unit (fig.4a #10); a second microphone unit (fig.4a #11) having a characteristic identical to a characteristic of the first microphone unit; a delaying section (fig.4a “All”) for outputting a signal output from the first microphone unit as being delayed by a predetermined delay amount (col.2 ln.14-22); an amplifying section (fig.4a “Gain”) for amplifying the signal output from the delay section; a first subtracting section for subtracting the signal amplified by the amplifying section from a signal output from the second microphone unit to generate the main signal; and a second subtracting section for subtracting the signal output from the

delaying section from the signal output from the second microphone unit to generate the noise reference signal (fig.4a "unlabeled differential array", col.5 ln.1-5), wherein the predetermined delay amount is set so that the noise reference signal includes components of a sound coming from a direction other than the direction of the target sound more than components of the target sound (col.4 ln.1-22), and an amplification factor in the amplifying section is set so as to cause a difference in a sensitivity to the target sound between the main signal and the noise reference signal (col.2 ln.49-50). At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the signal generating means of Buck to generate the main and reference signals of Ikeda. The motivation for doing so would have been to reduce the effects of crosstalk between the two inputs.

With respect to claim 6, Ikeda discloses the microphone device according to claim 5, however does not disclose expressly further comprising a setting section for changing the predetermined delay amount used in the delay section. Official Notice is taken that it is well known in the art that changing delay times of separate microphone inputs in an array will change the sensitivity pattern of the array. At the time of the invention it would have been obvious to a person of ordinary skill in the art to include a setting section in the invention of Buck in order to change the delay time of the Allpass filters. The motivation for doing so would have been to relocate the direction of the null, so as to prevent speech components from entering the reference channel of the system, as desired by Buck (col.2 ln.24-36). This would allow the system to update in the event

of a moving speaker or sound signal source.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda (US 6,285,768 B1) in view of Zhang et al (US 7,181,026 B2) in view of Yoshida et al (US 6,404,886 B1).

With respect to claim 11, Ikeda discloses the microphone device according to claim 1, however does not disclose expressly a reflection information calculating and correcting section.

Yoshida discloses an apparatus for echo cancelling comprising a reflection information calculating section (fig.9 #37) for calculating, based on the filter coefficient of the adaptive filter section, information about a difference in arrival time between a direct wave of the target sound and a reflected wave of the target sound (col.8 ln.65-67, col.9 ln.1-6); and a reflection correcting section (fig.7 "EC1, EC2") for correcting, based on the information calculated by the reflection information calculating section, distortion in a frequency characteristic of the main signal caused by the reflected wave, wherein the noise suppressing section suppresses the signal component of the noise included in the main signal by using the main signal corrected by the reflection correcting section and the noise reference signal after subtraction by the subtracting section (col.9 ln.6-18). At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the echo cancellation means of Yoshida in the invention of Ikeda. The motivation for doing so would have been to account for sound reflections being picked up by the microphones which would result in an echo.

Claims 14-17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda (US 6,285,768 B1) in view of Yoshida et al (US 6,404,886 B1).

With respect to claim 14, Ikeda discloses a microphone device which detects a target sound coming from a direction of the target sound, comprising: a signal generating section (fig.2 #1,2) for generating a main signal (fig.2 "x(k)") indicative of a result obtained through detection with a sensitivity in the direction of the target sound and a noise reference signal (fig.2 "y(k)") indicative of a result obtained through detection with a sensitivity higher in another direction than in the direction of the target sound (col.1 ln.47-55); a determining section (fig.2 #10,18) for determining whether a level ratio indicative of a ratio of a level of the main signal to the noise reference signal generated by the signal generating section is larger than a predetermined value (col.5 ln.49-60); an adaptive filter section (fig.2 #4) for generating a signal indicative of a signal component of the target sound included in the noise reference signal generated by the signal generating section by subjecting the main signal generated by the signal generating section to a filtering process at an adaptive filter included in the adaptive filter section (col.2 ln.28-36), and for learning a filter coefficient only when the determining section determines that the level ratio is larger than the predetermined value (col.5 ln.61-67, col.1 ln.1-59); a subtracting section (fig.2 #5) for subtracting the signal (fig.2 "r(k)") generated by the adaptive filter section from the noise reference signal generated by the signal generating section. Ikeda does not disclose expressly a reflection information calculating and correcting section.

Yoshida discloses an apparatus for echo cancelling comprising a reflection information calculating section (fig.9 #37) for calculating, based on the filter coefficient of the adaptive filter section, information about a difference in arrival time between a direct wave of the target sound and a reflected wave of the target sound (col.8 ln.65-67, col.9 ln.1-6); and a reflection correcting section (fig.7 "EC1, EC2") for correcting, based on the information calculated by the reflection information calculating section, distortion in a frequency characteristic of the main signal caused by the reflected wave, wherein the noise suppressing section suppresses the signal component of the noise included in the main signal by using the main signal corrected by the reflection correcting section and the noise reference signal after subtraction by the subtracting section (col.9 ln.6-18). At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the echo cancellation means of Yoshida in the invention of Ikeda. The motivation for doing so would have been to account for sound reflections being picked up by the microphones which would result in an echo.

With respect to claim 15, Ikeda discloses the microphone device according to claim 14, wherein the signal generating section includes: a first microphone unit being placed so that a main axis of directivity is oriented to the direction of the target sound; and a second microphone unit being placed so that a minimum sensitivity axis of directivity is oriented to the direction of the target sound (col.1 ln.47-55).

With respect to claim 16, Ikeda discloses the microphone device according to claim 14, further comprising a signal delay section (fig.2 #3), being provided between an output end of the noise reference signal in the signal generating section and the

subtracting section, for delaying the noise reference signal so as to satisfy conditions of convergence of the adaptive filter of the adaptive filter section (col.1 ln.60-65).

With respect to claim 17, Ikeda discloses the microphone device according to claim 14, wherein the predetermined value is changeable (col.5 ln.30-35).

With respect to claim 20, Ikeda discloses the microphone device according to claim 14, wherein the signal generating section includes: a first microphone unit; a second microphone unit having a characteristic identical to a characteristic of the first microphone unit (fig.2 #1,2, col.1 ln.47-55); and a combining section (fig.2 #13) for generating, based on signals output from the first and second microphone unit, the main signal with the sensitivity in the direction of the target sound, and generating a noise signal with minimum sensitivity in the direction of the target sound.

Claims 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda (US 6,285,768 B1) in view of Yoshida et al (US 6,404,886 B1) and in further view of Buck et al (US 7,020,291 B2).

With respect to claim 18, Ikeda discloses the microphone device according to claim 14, however does not disclose expressly the details of the signal generating section.

Buck discloses a method of generating a main signal (fig.4a “P”) and a reference signal (fig.4a “R”) including: a first microphone unit (fig.4a #10); a second microphone unit (fig.4a #11) having a characteristic identical to a characteristic of the first microphone unit; a delaying section (fig.4a “All”) for outputting a signal output from the

first microphone unit as being delayed by a predetermined delay amount (col.2 ln.14-22); an amplifying section (fig.4a "Gain") for amplifying the signal output from the delay section; a first subtracting section for subtracting the signal amplified by the amplifying section from a signal output from the second microphone unit to generate the main signal; and a second subtracting section for subtracting the signal output from the delaying section from the signal output from the second microphone unit to generate the noise reference signal (fig.4a "unlabeled differential array", col.5 ln.1-5), wherein the predetermined delay amount is set so that the noise reference signal includes components of a sound coming from a direction other than the direction of the target sound more than components of the target sound (col.4 ln.1-22), and an amplification factor in the amplifying section is set so as to cause a difference in a sensitivity to the target sound between the main signal and the noise reference signal (col.2 ln.49-50). At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the signal generating means of Buck to generate the main and reference signals of Ikeda. The motivation for doing so would have been to reduce the effects of crosstalk between the two inputs.

With respect to claim 19, Ikeda discloses the microphone device according to claim 18, however does not disclose expressly further comprising a setting section for changing the predetermined delay amount used in the delay section. Official Notice is taken that it is well known in the art that changing delay times of separate microphone inputs in an array will change the sensitivity pattern of the array. At the time of the invention it would have been obvious to a person of ordinary skill in the art to include a

setting section in the invention of Buck in order to change the delay time of the Allpass filters. The motivation for doing so would have been to relocate the direction of the null, so as to prevent speech components from entering the reference channel of the system, as desired by Buck (col.2 ln.24-36). This would allow the system to update in the event of a moving speaker or sound signal source.

Claims 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda (US 6,285,768 B1) in view of Zhang et al (US 7,181,026 B2) and in further view of Mitsuhashi et al (US 5,548,335).

With respect to claim 27, Ikeda discloses an audio system, comprising: a signal generating section (fig.2 #1,2) for generating, a main signal (fig.2 "x(k)") indicative of a result obtained through detection with a sensitivity in the direction of the target sound and a noise reference signal (fig.2 "y(k)") indicative of a result obtained through detection with a sensitivity higher in another direction than in the direction of the target sound (col.1 ln.47-55); a determining section (fig.2 #10) for determining whether a level ratio indicative of a ratio of a level of the main signal to the noise reference signal generated by the signal generating section is larger than a predetermined value (col.5 ln.49-60); an adaptive filter section (fig.2 #4) for generating a signal indicative of a signal component of the target sound included in the noise reference signal generated by the signal generating section by performing, by an adaptive filter included in the adaptive filter section, a filtering process on the main signal generated by the signal generating section (col.2 ln.28-36), and for learning a filter coefficient only when the determining

section determines that the level ratio is larger than the predetermined value (col.5 ln.61-67, col.1 ln.1-59); a subtracting section (fig.2 #5) for subtracting the signal generated by the adaptive filter section from the noise reference signal generated by the signal generating section.

Ikeda does not disclose expressly a noise suppressing section for suppressing a signal component of noise included in the main signal by using the main signal and the noise reference signal after subtraction by the subtracting section.

Zhang discloses a post-processing noise suppression section (fig.3 #31) for adaptive directional microphone systems that suppresses a signal component of noise included in a main signal (fig.3 "m1(n)") by using the main signal and a noise reference signal (fig.3 "e1(n)") after subtraction by a subtracting section (fig.3 #22). At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the post-processing section (fig.3 #31) of Zhang on the output of the noise cancelling system of Ikeda. The motivation for doing so would have been to enhance the noise/interference suppression of the adaptive directional microphone system as taught by Zhang (col.2 ln.65-67, col.3 ln.1-4).

Ikeda does not disclose expressly wherein the system includes an audio recording section for recording audio signals of channels of at least two types.

Mitsuhashi discloses a recording apparatus for recording audio signals along with video signals onto a recording medium (fig.1 #111). At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the audio microphone system of Ikeda in a recording apparatus such as the one provided by Mitsuhashi. The

motivation for doing so would have been to record audio signals that are absent of background and interfering noises.

With respect to claim 28, Ikeda discloses the audio player according to claim 27, further comprising: a video recording section for recording a video signal related to the audio signals recorded on the audio recording section; a video reproducing section for reproducing the video signal recorded on the video recording section; and a direction accepting section (fig.1 #109) for accepting from a user an input of a direction in which a sound is to be enhanced; wherein the signal generating section generates the main signal and the noise reference signal by taking the direction accepted by the direction accepting section as the direction of the target sound (col.5 ln.36-65). It is inherent that a video camera has a video recording and reproducing section.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yu et al (US 6,917,688 B2) discloses an adaptive noise cancelling microphone system.

Brennan et al (US 7,110,554 B2) discloses a sub-band adaptive signal processing in an oversampled filterbank.

Kanamori et al (US 6,639,986 B2) discloses a built-in microphone device.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON R. KURR whose telephone number is (571)272-0552. The examiner can normally be reached on M-F 10:00am to 6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on (571) 273-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JK
/Jason R Kurr/
Examiner, Art Unit 2615

/Vivian Chin/
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